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Dictyocaulus Filaria and *Muellerius capillaris* are Important Lungworm Parasites of Sheep in Wogera District, Northern Ethiopia

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Abstract: Cross-sectional study was conducted from October 2010 to March 2011 to determine lungworm species and their prevalence in sheep and evaluate the effect of risk factors in Wogera district, northern Ethiopia. Faecal samples were randomly taken from 390 heads of sheep for examination of first stage larvae (L1) of lungworms using a modified Baerman technique. The overall prevalence of lungworm infection was in sheep 67.69% (264 of 390). The lungworm species found were *Dictyocaulus filaria* (*D. filaria*) and *Muellerius capillaris* (*M. capillaris*) as single and mixed infection. The proportions of infection by *D. filaria*, *M. capillaris* and mixed were 55.30, 25.75 and 18.93%, respectively. Sex-wise infection rate was 69.78 and 68.15% in males and females, respectively with no significant difference ($p>0.05$) among them. The infection rate of *D. filaria* and *M. capillaris* infection could not show significant difference ($p<0.05$) among young (75%), adult (69.78%) and old (63.64%) age groups. Likewise, the infection rate between male and female animals did not show significant difference ($p<0.05$). This study showed high prevalence of lungworm infection which impairs the productivity of small ruminants, implying the need for control intervention.

Key words: *Dictyocaulus filaria*, Ethiopia, *Muellerius capillaris*, wogera

INTRODUCTION

Sheep constitute about18% of the total livestock population of the country (FAO, 1987). Three quarters of the national flock is located in the highland regions that receive more than 700 mm of rain per annum and are inhabited by three-fourths of the human population. The remaining 25% is located in the lowlands (with annual rainfall below 700 mm), which are inhabited by one-fourth of the human population. In spite of the numerical importance, the productivity per animal and the real contribution of the sub-sector to the national economy are far below expectation (Abebe *et al*., 2002). Helminthes parasites cause the most economically important diseases devastating sheep productivity in the country (Asegede, 1990; Ayalew, 1995; Assefa, 1997). The major endoparasitic diseases of economic importance include gastrointestinal and respiratory nematodosis, fasciolosis and cestodosis. It is estimated that 80% of the sheep population in the country is infected by the parasites (Asegede, 1990).

The prevalence of gastrointestinal nematodes is considerably influenced by geographic and climatic conditions. Ethiopia is a country where extremes of temperature and rainfall are experienced, altitude being the most important controlling factor (Yilma and Malone, 1998) and these could be crucial elements in influencing the development, distribution and survival of nematode parasites. The infection prevalence therefore varies greatly from region to region, corresponding to ecological and climatic diversity.

The pathogenicity of lungworm infections in sheep has received little attention. Some authors believe that it has a significant effect (Dunn, 1978; Corba *et al.*, 1985) while others associate it with mild eases of coughing and respiratory complications (Blood *et al.*, 1979).

D. filaria and *M. capillaris* have been reported as the major causes of lungworm infection in indigenous breeds of sheep in the Ethiopian highlands. Ayalew (1997) observed a high proportion (80.0%) of *D.filaria* recovery at post-mortem examination of sheep. Bekele *et al.* (1992) noted a prevalence of 53% from the highlands of Wello (Northern) and Arsi (Southern Ethiopia). In another study, 30.9 and 6.7% infection prevalence due to *M.capillaris* and *D. filaria*, respectively, were recorded from North Shoa, central Ethiopia, with peak infections observed during the long (June to August) and short rain seasons (February to March) (Assefa, 1997). However, the study area being highland with a large population of sheep, there is no any documentation regarding the prevalence of

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lungworm infection. Hence, the present study was planed to study the prevalence of lungworm infection so as to provide a basis for designing strategic control of this infection.

MATERIALS AND METHODS

Study area: Wogera District is located between 37.36ºE and 12.46^{0}N longitude and at an altitude of 2900 m. a. s. l in the northern highlands of Ethiopia. The rainfall pattern is bimodal, with a short rainy season from March to May, followed by a long rainy season from June to September. It has an average annual rainfall of 700 mm and the mean annual temperature is 12.7ºC (WWRAO, 2008).

Study population and type of study: The study was conducted on 390 indigenous sheep routinely presented to Wogera district veterinary clinic for any medical cases. A cross-sectional study design was used and the study was conducted on randomly selected sheep between October 2010 and March 2011.

Coprological examination: Fresh faecal samples were collected directly from the rectum of the animals. The samples were brought to the laboratory in labeled and closed universal vials and examined for lungworm larvae by a modified Baermann technique (MAFF, 1986).

Data management and analysis: The data were coded and entered into Microsoft$^{(R)}$ Excel (2002). The outcome variables were the cases of lungworm infection detected during faecal examination of lungworm larvae. SPSS software version 17.0 was used for analysis. The prevalence of lungworm infection was calculated as the number of sheep found infected with lungworms expressed as a percentage of the total number of previously selected sheep (Thrusfield, 2005).

RESULTS AND DISCUSSION

Of the 390 faecal samples collected from the study animals, 264 (67.69%) were positive for lungworm infection. The species of lungworms identified were *D. filaria* (55.30%) and *M. capillaris* (25.76%). *D. filaria* infection had a significantly higher ($p<0.05$) prevalence than *M. capillaries*. Of the positive faecal samples, 50 (18.94%) showed the presence of mixed infection by both species of lungworms as shown in Table 1.

The infection rate of lungworms in different age groups was 75.0, 69.78 and 63.63% in young adult and old, respectively. Statistical analysis indicated that there was no significant difference in the overall prevalence of infection among the age categories ($p>0.05$) (Table 2).

Table 1: Prevalence of single and multiple infections of lungworms in sheep (n = 264)

Species	Positive (%)
D. filaria	146 (55.30)
M.capillaris	68 (25.75)
Mixed (*D. filarial + M. capillaries*)	50 (18.93)
Overall prevalence	264 (67.69)

Table 2: Prevalence of lungworm infection in sheep relative to host age and sex

Factors	Number of sheep examined	Positive (%)
Age		
Young (<1 year)	64	48(75)
Adult (2-4year)	139	97(69.78)
Old (>4 year)	187	119(63.63)
Sex		
Male	142	95 (66.90)
Female	248	169 (68.15)
Total	390	264 (67.69)

Likewise, the infection rate between male and female nimals did not show significant difference ($p>0.05$) and prevalence was recorded as 66.90 and 68.15%, respectively.

In this study, the overall prevalence of lungworm infection recorded was 67.69%. This result is relatively similar with those of other researchers elsewhere in the world who reported the prevalence as 53.17% in Ankara (Doganay *et al*., 1989), 47.2% in Kars provinces, Turkey (Umur and Arslan, 1998), 53.6% in northeast Ethiopia (Alemu *et al*., 2006). The overall prevalence of lungworm infections was higher than the prevalence (33.8%) reported by Oncel (2000) in South Marmara Region, Turkey and Mekonnen *et al*. (2011) (30.43%) in Gondar, Northern Ethiopia. Prevalence of lungworm infections in sheep varied depending on climate conditions and management practices (Soulsby, 1986). On the other hand, our results confirmed the findings of other studies performed in some part of the world (Alemu *et al*., 2006; Girisgin *et al*., 2008).

Two species of bronchopulmonary nematodes were identified; namely, *D.filaria* and *M. capillaries*. The proportions of infection by *D. filaria*, *M. capillaris* and mixed were 55.30, 25.75 and 18.93%, respectively. A lower prevalence of *D. filaria* was reported by Regassa *et al.* (2010) (1.3%) in Dessie and Kombolcha districts, northeastern Ethiopia and Ghanem *et al.* (2009) in northern Somalia. However, similar results were obtained in the prevalence of *M. capillaris* and mixed infection (28.3 and 10.8%, respectively) in sheep. Nematollahi and Moghaddam (2009) reported an infestation rate of sheep to *D. filarial* and *M. capillaries* as 28.9 and 29%, respectively in Tabriz, Iran which is lower than the present study result.

The result of this study show that younger animals to be more affected than older animals which supports the idea of Dunn (1978). However, the difference obtained in

this study is not so high to arrive at a conclusion that older animals are less susceptible. So the author of this work believes animals of all age are affected by lungworms. These findings disagree with the study of Alemu *et al*. (2006) from northeast Ethiopia and Thomson and Orita (1988) from north-west Syria. They found that the highest infection rates with lungworm were observed in older than younger. No much difference was obtained as to the prevalence of the parasite in different sexes. Alemu *et al.* (2006) showed that female animals are more susceptible to lungworms infection than males. However, in this study the effect of sex could not analyze. This shows that there is no sex susceptibility in the infection of ovine lung worms.

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